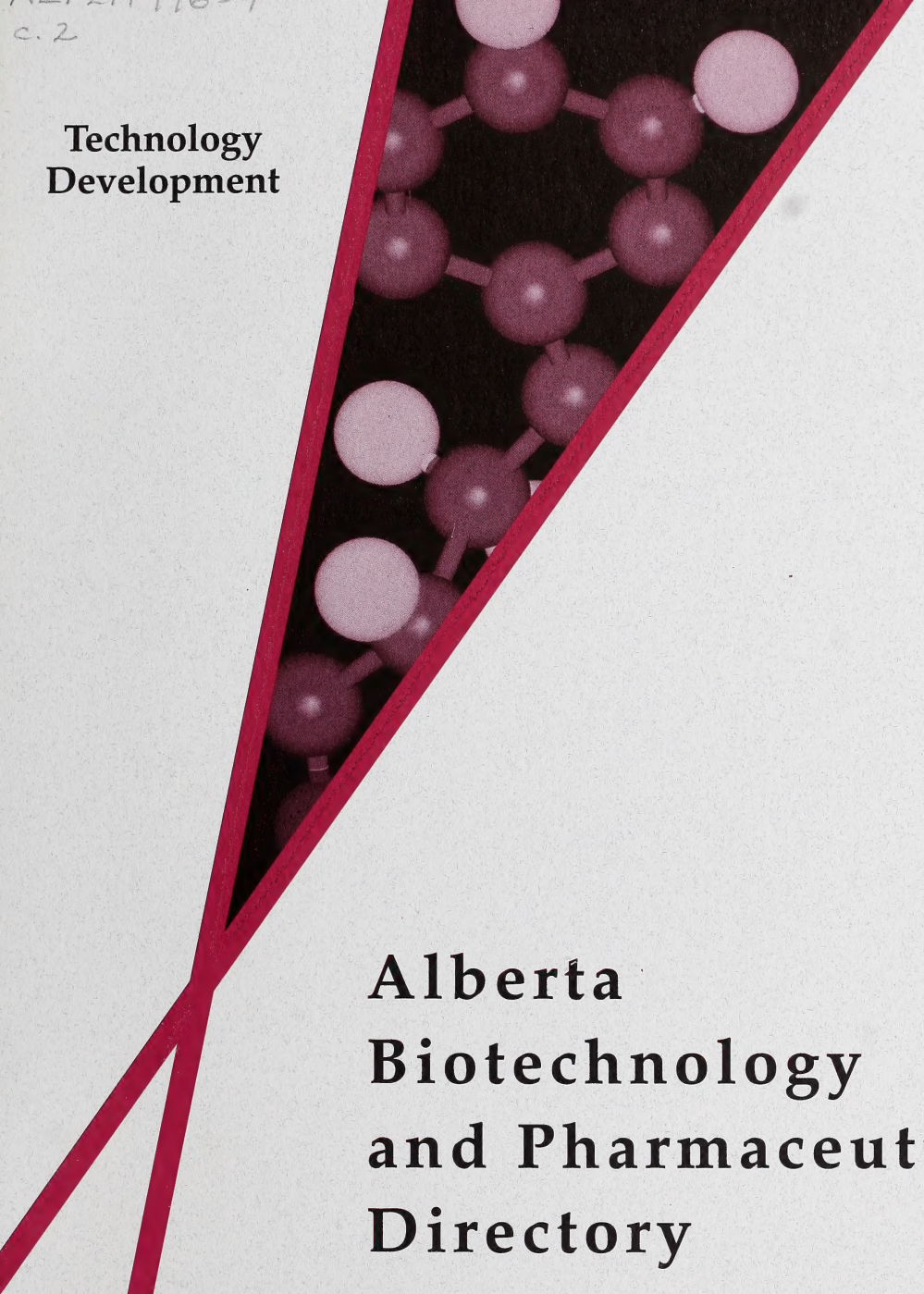
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Technology Development

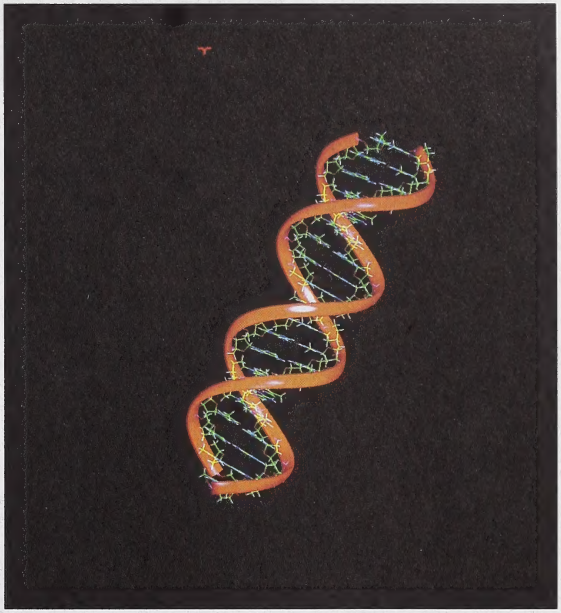


Alberta Biotechnology and Pharmaceutical Directory


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Buying into biotechnology



Neither a single scientific discipline nor a specific technology, biotechnology encompasses the science of all living matter. Virtually unheard of before the 1970s, when scientists made landmark discoveries related to DNA, biotechnology is now the focus of worldwide scientific interest and research.

Genetically engineered pharmaceuticals, disease resistant crops, "living" fertilizers, advanced pesticides and waste management systems all result from innovative research and development in the field of biotechnology.

Alberta has secured a foothold in this multifaceted field by encouraging biotechnology research in universities, funding technology transfer, and investing in one of North America's most advanced fermentation facilities.

Several Alberta-based companies now have medical and industrial biotechnology products either on the market or in various phases of development and testing. These pioneers are well positioned to play a leadership role in a global industry that offers virtually limitless opportunities for growth.

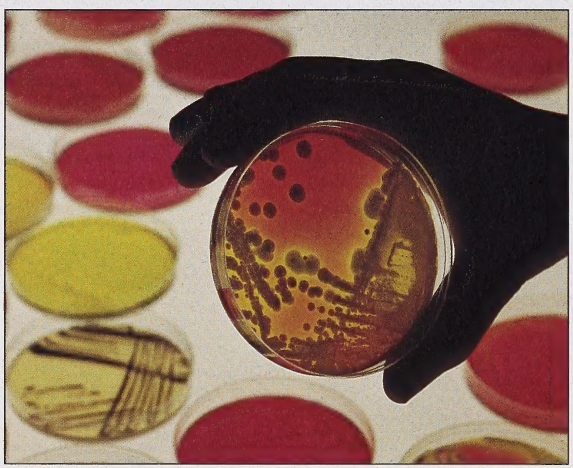


Photography: Don Hammond
Courtesy of Duck Soup Graphics and Norwest Soil Research Ltd.

Medical research: improving health care, building the economy

In less than two decades, Alberta has capitalized on its strengths in medical research to become one of North America's most active and influential centres of medical science and health care research.

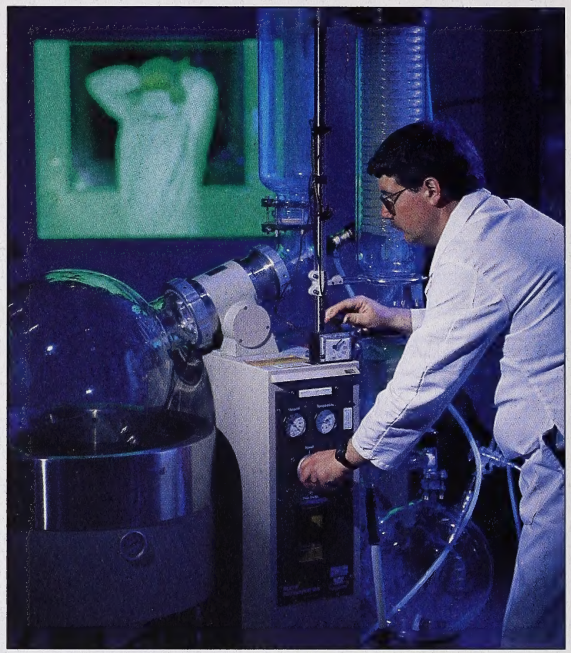
Behind the transformation lies an impressive pool of medical resources and talented researchers, an aggressive provincial science and technology strategy, and an entrepreneurial atmosphere that encourages technology transfer.



Photography: Don Hammond
Courtesy of Duck Soup Graphics and Norwest Soil Research Ltd.

A major catalyst for growth has been the Alberta Heritage Foundation for Medical Research (AHFMR). By supporting world-class researchers in Alberta universities, the Foundation has helped propel the province into the front ranks of the fast-growing and competitive global health care industry.

Leading edge research in such fields as cancer, cardiac disease, diabetes, arthritis, liver disease and lung disease; discoveries that could lead to the repair of damaged nerve and brain cells; and a new generation of Alberta-born pharmaceuticals and drug therapies all attest to the scope and success of Alberta's medical research programs.



Synsorb Biotech Inc.

As outlined in the following pages, many discoveries in the field of pharmaceuticals and biomedical technology are being further developed and commercialized by new Alberta companies. Others have been adopted by multinational pharmaceutical firms.

More and more of Alberta's research successes are moving from the laboratory to the marketplace, setting the stage for a diverse biotechnology and pharmaceutical industry. Alberta's dynamic medical research environment continues to create singular opportunities for investment and strategic partnerships.

Industrial biotechnology: accelerating agricultural innovation, cleaning the environment

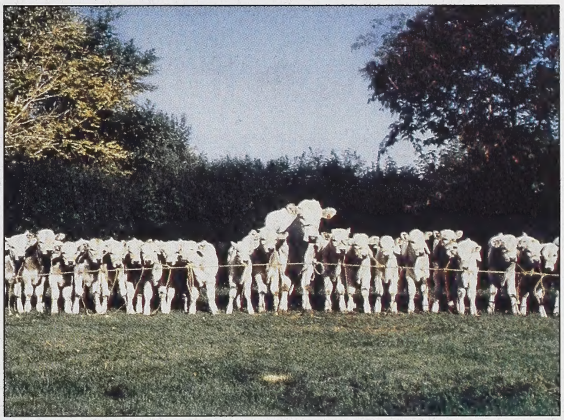


Photography: Don Hammond
Courtesy of Duck Soup Graphics and Norwest Soil Research Ltd.

Industrial biotechnology is evolving as an economic force in Alberta. Agricultural and environmental applications, in particular, demonstrate the strategic importance of biotechnology as a science and as a contributor to Alberta's wealth, employment and competitive position in world markets.

The **agricultural biotechnology** sector encompasses plant biotechnology, biopesticides and bioherbicides, animal health, food processing and agriculture. Application areas include pest, disease and herbicide resistant plant varieties (canola, cereal grains and legumes).

The importance of agriculture and food processing to the Alberta economy sparked an early interest in animal and plant biotechnology. A network of government agencies and veterinary laboratories, including Canada's largest federal agriculture research station in Lethbridge, focuses on improving agricultural productivity. The agriculture industry has been quick to utilize new technologies and, with the recognition that Alberta has one of the world's most productive and technologically advanced agricultural sectors, substantial efforts in research and commercialization are underway.



Alta Genetics Inc.

In the field of animal biotechnology, Alberta has made notable strides in embryo transplant technology, animal genetics and animal vaccines. Animal biotechnology researchers have created the world's first cloned and transgenic bovine animals, gaining international recognition for Alberta's bovine biotechnology and genetic expertise.

Alberta's **environmental biotechnology** sector focuses on waste management, biomass, remediation, recycling and materials re-use.

In developing applications to satisfy the needs of Alberta resource industries, particularly the oil and gas industry, environmental biotechnology companies have gained expertise that has allowed them to expand and compete internationally.

The requirement for waste treatment and site clean-up has created opportunities for expanded commercial applications of environmental biotechnology in all economic sectors.

World-class infrastructure: building expertise, attracting talent

The Alberta Heritage Foundation for Medical Research

In 1979, when the Government of Alberta decided to invest $300 million in an endowment fund for the **Alberta Heritage Foundation for Medical Research** (AHFMR), the long-term goal was as clearly stated as it was ambitious: to make Alberta a world centre for medical research.

In conjunction with the University of Alberta and The University of Calgary, the Foundation has recruited more than 150 senior scientists from Canada and around the world. Provided with university laboratories and ample time for research, these world-class investigators work in multi-disciplinary teams to solve dozens of pressing medical mysteries, earning scientific honours and international prestige for Alberta in the process.



Alberta Heritage Foundation for Medical Research

To date, the more than $450 million invested by AHFMR in university-based medical research has paid handsome dividends. Alberta's medical researchers now attract support from private industry and public funding agencies at a rate of two to three dollars for every AHFMR dollar invested.

The Foundation has funded training for hundreds of promising young medical researchers; and its technology transfer program provides seed capital to scientists and entrepreneurs to develop prototypes, test new products and conduct clinical trials.

The achievements of researchers supported by AHFMR have led to Alberta being recognized as one of the major medical research centres in North America, as rated by an International Board of Review. The quality of research has enabled Alberta to greatly increase its share of medical research funding from federal agencies.

For more information, contact: (403) 423-5727

The University of Alberta

Located in Edmonton, the **University of Alberta** (U of A) is Canada's second largest university. A widely recognized teaching and research institution founded in 1908, it has a full-time student enrollment of 26,000, including 3,300 graduate students.

Biotechnology research and commercialization is a major thrust at the U of A, encompassing a wide range of medical and industrial applications. To coordinate activities in this field, an Advisory Committee on Biotechnology was established with representation from Immunology, Forest Science, Pharmacy and Pharmaceutical Sciences, Pediatrics, Zoology, Chemical Engineering, Biochemistry, Soil Science, Microbiology and Genetics. Its mandate is the enhancement of biotechnology research and technology transfer. The University has encouraged the growth of research centres, spin-off companies, research chairs and graduate programs in biotechnology.

The **University of Alberta Faculty of Medicine** offers one of the nation's premier environments for medical science, due in large measure to the dramatic impact of the Alberta Heritage Foundation for Medical Research. Foundation support has enabled the Faculty to recruit outstanding basic science researchers and clinician-scientists from around the world.

The University retains its long-standing international reputation in biochemistry and immunology research while adding new strengths in such fields as lipids and lipoproteins, cancer, and neurosciences. It has recently established departments of Oncology, Medical Genetics, and Cell Biology.

U of A research groups in Protein Engineering, Bacterial Diseases, Neurosciences, and Respiratory Diseases function in the national Networks of Centres of Excellence program. The University of Alberta Diabetes Group, world leaders in transplanting insulin-producing islet cells, was named one of six North American Centres of Excellence by the Juvenile Diabetes Foundation International.

The work of another U of A research team, which developed a breakthrough Anti-Hepatitis B drug, resulted in Glaxo Canada Inc. committing $15 million to support the **Glaxo Heritage Research Institute** for virology studies at the University.

The biomedical research program, which currently receives approximately $48 million in private and public sector funding, is conducted in a superb research environment. **The Heritage Medical Research Centre** is adjacent to the $650-million **Walter C. Mackenzie Health Sciences Centre**, a world-class facility combining clinical care, medical training and research. Also part of this network are a half-dozen Edmonton health care research facilities, including the Cross Cancer Institute.



Walter C. Mackenzie Health Science Centre

The **Healthcare Quality and Outcomes Research Centre,** located in the University of Alberta Faculty of Medicine, is supported by both AHFMR and health care facilities in the Edmonton area. The Centre conducts clinical and evaluative research, supports health services researchers, and acts as an information centre for regional health care institutions.

The **University of Alberta Faculty of Pharmacy and Pharmaceutical Sciences** is noted for an exceptionally strong graduate program, wide-ranging research activities and an excellent record of technology transfer. Faculty members are a diverse group of researchers in medicinal chemistry, radiopharmaceutical chemistry, therapeutics, pharmaceutics, pharmacokinetics, pharmaceutical biotechnology, pharmaceutical oncology and pharmacy administration. Research projects include monoclonal antibodies for cancer therapy, cancer vaccines, gene therapy, and drug delivery systems.

The **University of Alberta Biotechnology Centre in Agriculture, Food and Nutritional Science** utilizes molecular biology to improve plant growth and disease resistance, and induce production of antibiotics, antifungal agents and secondary metabolites important in medicine and nutrition.

Current activities in plant and crop biotechnology include projects related to potatoes, trees, wheat, canola, corn, alfalfa and forage crops. U of A researchers also focus on food biotechnology. One project, for example, explores food shelf-life preservation relevant to the meat industry.

For more information, contact:
(403) 492-6621 (Faculty of Medicine) or
(403) 492-3111 (general enquiries)



Microbiology Lab, University of Calgary

The University of Calgary

The **University of Calgary** (U of C) has a student enrollment of approximately 18,000, including more than 200 undergraduates and 350 graduate students and post-doctoral fellows in the Faculty of Medicine.

The **University of Calgary Faculty of Medicine** receives upwards of $40 million in peer reviewed research grants annually. Like the University of Alberta, the number of skilled medical researchers at the U of C Faculty of Medicine has increased dramatically in response to AHFMR support. At least five research groups currently conduct international calibre investigations in areas ranging from cardiovascular disease and neurosciences to gastro-intestinal disease, oncology and cell signalling.

U of C medical scientists participate in four national Networks of Centres of Excellence: Bacterial Diseases, Neuroscience, Genetic Diseases, and Respiratory Health.

Reflecting the leading edge research being conducted in the University's laboratories, the Signal Transduction Group received a $3.1 million grant from the Medical Research Council of Canada.

In another area, one U of C Heritage scientist found a way to cut the risk of rejection when insulin-producing cells from the pancreas are transplanted to the liver; another has discovered two genes involved in the development of diabetes. Both discoveries could someday contribute to the prevention of the disease.

In the field of gastro-intestinal research, a simple test developed by U of C scientists to detect ulceration in the gastro-intestinal tract is now being marketed internationally. University neuroscientists exploring the regeneration of brain stem cells have made discoveries that offer new hope for victims of brain injury, stroke, and diseases such as Alzheimer's. With the help of AHFMR technology commercialization funding, researchers have entered a joint venture called NeuroSpheres Ltd. with major international pharmaceutical firms, Chiron Corporation and Ciba-Geigy Canada Ltd. to further develop this technology.

The Centre for Advancement of Health, founded in 1988 and located in the Foothills Medical Centre, is a major resource to clinical investigators, including members of the U of C Faculty of Medicine and other health professionals who wish to assess the relative effectiveness of various health care procedures, devices and drugs. The Centre helps researchers with everything from study design and biostatistics to budgeting and accounting and works closely on clinical evaluative research projects with the University of Alberta's Healthcare Quality and Outcomes Research Centre.

Beyond its focus on biomedical technology, the University of Calgary encompasses extensive expertise and activities in plant biology and engineering, animal health and energy sector biotechnology. Major areas of interest include bio-pharmaceuticals protein production, animal health vaccines and aquaculture hormones.

For more information, contact:
(403) 220-6853 (Faculty of Medicine) or
(403) 220-5110 (general enquiries)

The University of Lethbridge

Biotechnology activities at the **University of Lethbridge** primarily involve molecular and biochemical studies of agricultural crops, although additional studies investigate native plants, bacteria and cattle. Studies with oilseed crops, including canola, investigate the rate-limiting steps in oil formation and genes regulating plant hormone biosynthesis and action. DNA-based procedures are used for studies of the genetic diversity, evolution and conservation of native plants, particularly *Senecio* and *Populus*, and for the identification of bacteria associated with food poisoning.

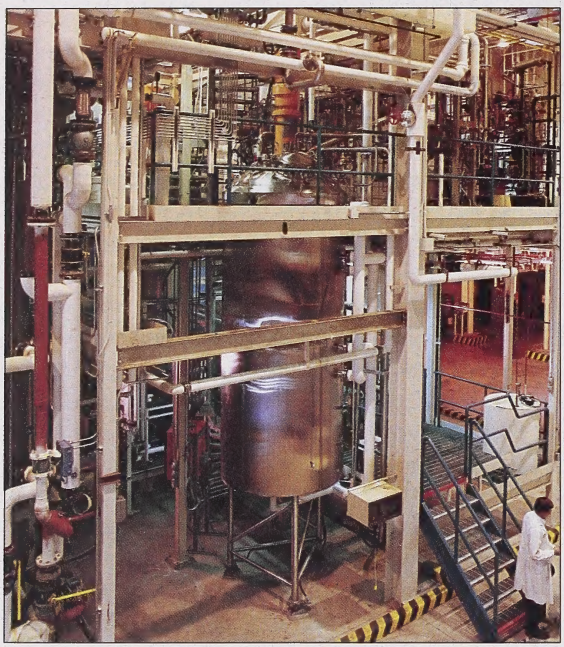
The Lethbridge plant biotechnology research group receives funding from NSERC, other federal and provincial sources, and from the agricultural industry. Labs are well-equipped with DNA synthesizers, a DNA sequencer, organic mass spectrometers and electron microscopes. With a cluster of active plant scientists at Lethbridge and collaborative linkages across the nation and around the world, Lethbridge is emerging as a leading research centre in agricultural biotechnology.

For more information, contact: (403) 320-5700

The Institute of Pharmaco-Economics

The **Institute of Pharmaco-Economics** is a cooperative effort of the Universities of Alberta and Calgary, the Alberta Government, the AHFMR, the Government of Canada and pharmaceutical companies. Working with and supported by industry, the Institute will carry out cost-benefit and cost-effectiveness analyses of new drugs and classes of drugs, produce policy studies on issues affecting the industry, and develop improvements to existing methodologies.

For more information contact: (403) 422-0561



Biotechnology Pilot Plant, Alberta Research Council

The Alberta Research Council

Since its inception in 1921 as Canada's first provincially supported research council, the **Alberta Research Council** (ARC) has been a leader in promoting technologies that advance Alberta's economy. The ARC works with industry through contract research or fee-for-service arrangements and through Joint Research Ventures, in which both participants share their resources to develop innovative products and processes for which a recognized market exists.

The **Biotechnology Pilot Plant**, established in ARC's Edmonton headquarters in 1984, is the largest publicly-owned facility of its kind in Canada, offering 40,000-litre fermentation capacity and extensive up and downstream processing capability. It has built an impressive record of successful partnerships with industry at provincial, national and international levels.

In recent years, the Biotechnology Department, which has programs in both fermentation microbiology and synthetic oligosaccharide (sugar) chemistry, has increased its focus on pharmaceutical research. In particular, it works with international clients to develop new products. In order to help stimulate a sustainable biotechnology manufacturing industry in Alberta, ARC attempts to spin off new corporate entities based on its own technology or technology acquired elsewhere.

For example, carbohydrate research developed at the University of Alberta and transferred for commercial development to the ARC, was licensed to SYNSORB Biotech Inc. This SYNSORB technology has potential application in the treatment of diseases that cause intestinal disorders such as Hemolytic Uremic Syndrome, known in its early stages as "hamburger disease".

The ARC Biotechnology Department also has industrial capabilities in the agriculture, environment and forestry sectors and assists industries in such areas as industrial enzymes, biopolymers, inoculants, and animal vaccines.

For more information, contact: (403) 450-5111

The Alberta Agricultural Research Institute

The **Alberta Agricultural Research Institute** offers programs to support the research and development of products and technologies of potential benefit to Alberta's agri-food industry. These include improving the quality, safety and nutritional value of Alberta foods through testing, adapting and integrating new biotechnology applications of benefit to Alberta's producers and processors.

For more information, contact: (403) 427-1956

The Alberta Environmental Centre

The **Alberta Environmental Centre** (AEC) in Vegreville conducts research and develops technology related to environmental protection. Activities focus on bioherbicides/biopesticides, animal health, aquaculture, forestry, energy and the environment.

For more information, contact: (403) 632-8211

Agriculture & Agri-Food Canada

At its Lethbridge Research Station, **Agriculture & Agri-Food Canada** conducts research in plant biotechnology, biopesticides/bioherbicides and animal health.

Activity areas include crops (wheat, pulse, potato, canola, safflower etc.); forage crop development; and management of diseases, insect pests and weeds, including biological control, agronomy, physiology, molecular biology and pollination. Animal health activities for beef, dairy cattle and sheep include genetics, nutrition, physiology (including reproductive physiology), rumen microbiology and genetic engineering. Activities for the management of insect pests and parasitology include toxicology, immunology, insect ecology, biological control, and pesticide chemistry.

Activities at the Lacombe Research Station include biological weed and disease control, genetic promotion of disease resistance in oats, barley and legumes, and the development and testing of glufosinate tolerant canola.

Animal and food biotechnology activities include biological control of pathogens and spoilage bacteria on meat to improve quality and extend shelf life of processed meats; protected amino acids to effect lean/fat tissue composition on meat quality; and DNA analysis of the halothane gene in swine.

For more information, contact:
(403) 327-4561 (Lethbridge) or
(403) 782-3316 (Lacombe)



Alberta Environmental Centre, Vegreville

Challenging cancer: fighting on the front lines

Alberta's province-wide cancer care program ranks with the best in the world. The driving force behind the program is the **Alberta Cancer Board**, which coordinates cancer treatment, research, education and prevention programs, and oversees care centres throughout the province.

The **Cross Cancer Institute** in Edmonton is formally affiliated with the University of Alberta Faculty of Medicine, Department of Oncology. Linked to a number of cancer care centres throughout the northern part of the province, the Institute is both a diagnosis and treatment centre for cancer patients and a major focus for cancer research and education.

In newly expanded facilities that include 35,000 square feet of applied research space, some of the world's most highly regarded cancer specialists oversee laboratory research that includes exploration of the genetic basis of cancer development. Using a "bench-to-bedside" approach, the Cross Cancer Institute conducts on-going clinical trials of anti-cancer drugs, various therapy combinations, monoclonal antibody technology and immunotherapies to prevent recurrence of cancer.

For more information, contact: (403) 492-8771

The **Tom Baker Cancer Centre** in Calgary and its associated clinics provide the focus for cancer care in southern Alberta. Affiliated with the University of Calgary and the Foothills Hospital, the Centre is involved in a number of collaborative research projects, including the testing of radio-pharmaceuticals for the diagnosis and treatment of cancer.

For more information, contact: (403) 670-1711

In addition, Biomira Inc., Biomira Research Inc. and Briana Bio-Tech Inc., all based in Edmonton, are working to develop and commercialize innovative products and technologies for the diagnosis and treatment of cancer.



Biomira Inc.

Technology transfer: transforming research into products



SynPhar Laboratories Inc.

Medical science creates good business opportunities. Alberta's medical research community places high priority on technology transfer.

The **University of Alberta Industry Liaison Office** pursues sponsored research, working with research groups to identify potential industry partners while overseeing the details of patents, copyrights and licensing. The primary role of the Office is to develop collaborative university/industry research programs which promote excellence in research and development at the University of Alberta. The mandate of the Office is broader than intellectual property and contracts, and includes university research development in the broader sense.

Spin-off ventures from the University of Alberta have included SynPhar Laboratories Inc., S.P.I. Synthetic Peptides Inc., Biomira Inc. and CV Technologies Inc.

For more information, contact: (403) 492-3333

University Technologies International Inc. (UTI), wholly-owned by the University of Calgary, provides services on all matters related to technology transfer and the commercialization and management of intellectual property. Its present clients include the University of Calgary, the University of Lethbridge, the Foothills General Hospital and Imperial Oil Resources. UTI also provides contract services and licensing assistance to a variety of research organizations, government laboratories, companies and individuals in southern Alberta. UTI's general operating philosophy is to act as the intermediary between client investors and corporations seeking access to new technology with commercial potential.

Much of UTI's licensing activity centres around advances in the fields of medicine and biotechnology. UTI has negotiated a number of licenses for promising vaccines, diagnostics and therapeutics. Recently, UTI created a new biotechnology company, SemBioSys Genetics, Inc., which holds the rights to technology developed in the U of C Department of Biological Sciences. This technology enables the genetic alteration of oilseed crops such as canola to produce low-cost, high-value proteins useful in the pharmaceutical and food industries.

For more information, contact: (403) 220-3790

Our research parks: assisting biomedical entrepreneurs

Alberta's thriving research parks illustrate the power of technology transfer and the growing interaction between the academic and business worlds.

The **Edmonton Research Park**, formed in 1980 through the efforts of the University of Alberta and the City of Edmonton, now comprises 320 acres, housing over 30 companies and organizations which employ in excess of 1,000 scientists, engineers, technicians and support staff.

The Park operates two buildings. **Research Centre One** is a multi-tenant facility, designed for companies who require a specialized working environment. Canada's fastest growing biotechnology company, Biomira Inc., operates a world-class clean room in this building. The **Advanced Technology Centre** is an award-winning advanced technology incubator, designed to accommodate technology-based entrepreneurs.



Advanced Technology Centre, Edmonton Research Park

Biotechnology companies are drawn to the Edmonton Research Park by the Biotechnology Pilot Plant. Housed in the Alberta Research Council, the plant provides process development, scale-up and manufacturing for emerging biotechnology companies, serving as a bridge between the laboratory and commercial production.

For more information, contact: (403) 462-2121

The **University of Calgary Research Park** is Canada's oldest and most successful university-related park. Established in 1966, it houses more than 45 organizations. Specializing in animal/mammalian cell biotechnology, this U of C enterprise encompasses a tissue culture lab and biotechnology pilot plant. Clients include major Canadian biotechnology firms.

The 125-acre Park has more than a million square feet of developed research facilities in 13 buildings, including incubator facilities. Resident companies, all engaged in scientific investigation, testing and pure/applied research, are encouraged to interact with the University. The Park's location adjacent to the campus facilitates research and technology transfer.

For more information, contact: (403) 282-0464

Programs and services: investing in our future, investing in our health

The favorable investment climate in Alberta has consistently attracted one of the highest per capita investment rates in Canada. Alberta's personal and corporate tax rates are among the lowest in Canada and Alberta remains the only province with no provincial sales tax. Investors seeking opportunities in emerging technologies in Alberta are able to access a number of provincial and federal programs.

Vencap Equities Alberta Limited is a $294 million venture capital fund that provides equity-linked assistance to entrepreneurs to develop high risk or innovative businesses that may further diversify the Alberta economy. The types of investment Vencap offers include: start-up, turnaround, expansion and leveraged buy-out. Vencap does not seek to control or manage its client companies. Rather, Vencap prefers to maintain a minority position and help its clients achieve their goals and objectives.

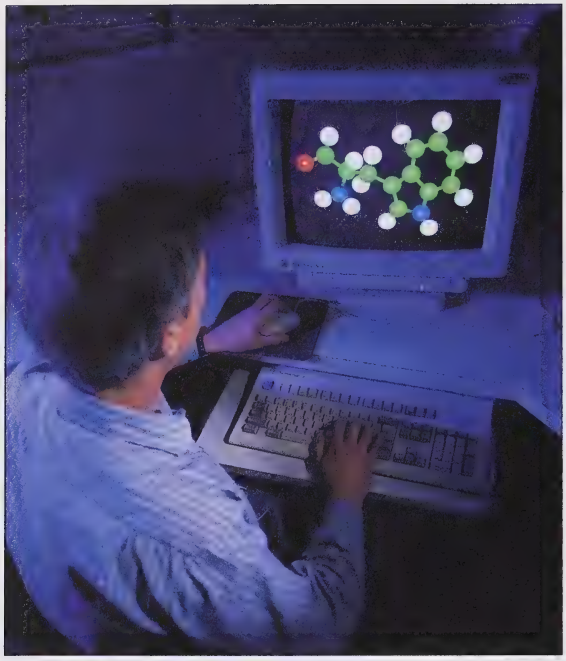
For more information, contact: (403) 420-1171



Banner Pharmacaps



Grow-Tec Ltd.



SynPhar Laboratories Inc.

The Alberta Opportunity Company (AOC) was established by the Government of Alberta to stimulate the creation of new businesses and to assist in the expansion of existing enterprises. The Loans Division provides loans to small-and medium-sized businesses that are unable to obtain financing from private sector commercial lenders, or guarantees operating loans from other lenders. There are no pre-set lending maximums, although AOC prefers to restrict its advances to under $1,000,000.

AOC's **Export Financial Assistance** (EFA) was developed to help Alberta-based businesses obtain working capital loans to fill export orders or to replace imports with Alberta manufactured products and services. Lines of credit can be set up before a business has a confirmed order or contract to supply a product or service to a non-related purchaser. Loans guaranteed under EFA are subject to a maximum of $1,000,000 for any one business at one time.

In addition to its Loan Division, AOC has a Consulting Services Division, where professional consultants provide expertise in such areas as finance and accounting, marketing, merchandising, manufacturing and computer systems. A nominal fee is charged on an hourly basis. All businesses qualify for this service.

AOC may also be contacted through its offices in Ponoka, Lethbridge, Medicine Hat, Red Deer, Grande Prairie, Brooks, Edson, Peace River and St. Paul.

For more information, contact: (403) 427-2140 (Edmonton), (403) 297-6437 (Calgary) or 1-800-662-7153 (Canada)

The Industrial Research Assistance Program (IRAP) is a National Research Council initiative established to provide technical assistance to small and medium-sized Canadian companies that wish to strengthen and enhance their technological capabilities. Industrial Technology Advisors (ITAs) are located at offices throughout Canada, providing consultation and advisory services to entrepreneurs and small and medium-sized companies.

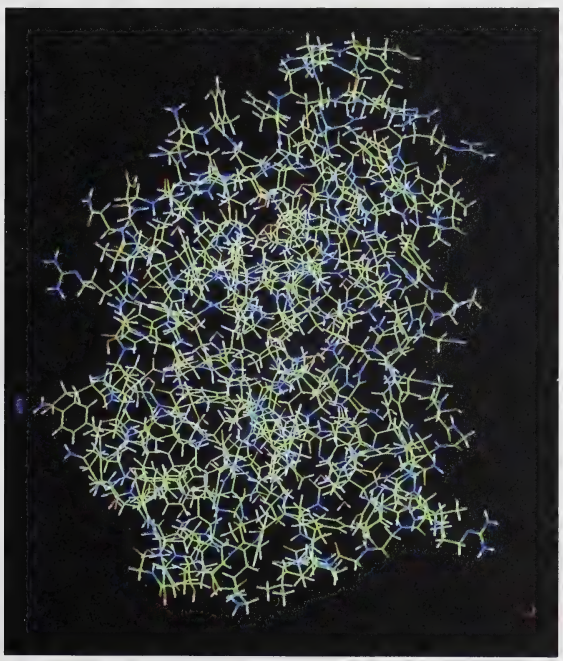
For Technology Enhancement projects, IRAP will fund up to 75 per cent of eligible project costs, normally covering salaries or the charges of subcontractors or consultants. Support is limited to $15,000 per project and $25,000 per applicant per year.

For Research, Development and Adaptation (RDA) projects, companies are provided with technical and financial assistance for more costly, longer term projects where there is significant technical risk and where there is an identifiable commercial objective. IRAP will provide support of $15,000 to $350,000, covering up to 36 months. IRAP's share of the project costs is not to exceed 50 per cent.

For more information, contact:
(403) 495-6509 (Edmonton) or
(403) 297-2600 (Calgary)

The **Alberta Heritage Foundation for Medical Research Technology Commercialization Program** funds commercialization of medically-related innovations so that new technology can be translated into improved health care. The program promotes research/industry collaboration and fills the funding gap when a commercially promising project does not fit the mandate of traditional medical research funding agencies and is not developed enough to attract outside investors. Three phases of funding range from $25,000 to $500,000. Support is available to individuals in any Alberta-based company or Alberta university, hospital or affiliated institution.

For more information, contact: (403) 423-5727



Legend


Agricultural Biotechnology


Environmental Biotechnology


Pharmaceuticals


Animal Health


Research


Diagnostics


Testing

A

AgrEvo Canada Inc.



204, 1144 - 29 Avenue N.E.
Calgary, Alberta
T2E 7P1
(403) 250-7294 Fax: (403) 250-5882

Contact: Mr. Calvin Sonntag,
Senior Research Coordinator

Company Founded: 1994

Products and Services: AgrEvo Canada Inc. is a wholly-owned subsidiary of Hoechst Schering AgrEvo Gmbh, headquartered in Berlin, Germany. The company was formed as a worldwide joint venture between the crop protection businesses of Hoechst AG and Schering AG (known as NOR-AM in Canada), allowing the new organization to consolidate its position as the leading supplier of innovative crop protection technologies to Canadian farmers. Current activities focus on glufosinate resistance in canola and other crops.

Development efforts in Alberta also include the evaluation of new, emerging value-added traits which flow from AgrEvo's worldwide biotechnology research facilities.

The company's biotechnology activities in Alberta, although centred at the Innisfail Research and Development Farm, include many collaborative projects throughout the province with private and public research partners. These relationships and the direct efforts of AgrEvo Canada Inc. will ensure that the company continues to break new ground in crop protection and plant biotechnology.

Alta Genetics Inc.

Site 12, Box 12, R.R. 4
Calgary, Alberta
T2M 4L4
(403) 239-8882 Fax: (403) 241-4524

Contact: Dr. Ted Mitenko, Vice President

Company Founded: 1986

Products and Services: Alta Genetics Inc. produces and markets products and services based on cattle genetics designed to increase the efficiency of milk and meat production.

The company specializes in bull semen, cow embryos, live cattle and reproductive technologies. It conducts one of North America's largest cattle embryo production and marketing operations. The company exports elite dairy and beef genetics as embryos, semen and live cattle to more than 50 countries and its international activities include all export documentation. Alta Genetics provides consulting services, technology transfer and training programs for livestock improvement.

The Alta Genetics Production Unit houses a modern embryo transfer facility suited to non-surgical embryo collection and transplantation.

The company operates Canada's largest private sector research program in cattle genetics and reproductive technologies. The Alta Genetics Research Unit has facilities for embryological research *in vitro* fertilization, embryo sexing and cryopreservation of embryos.

In the U.S., Alta-Genetics operates two wholly-owned subsidiaries, Maple Leaf Genetics Inc. and Landmark Genetics Inc. The company also has offices in three Latin American countries and representatives in many other international centres.

Key alliances include the National Research Council of Canada, Semex Canada, the University of Calgary, and beef and dairy breeding farms across Canada.

ATC Environmental Group Inc.

325 - 10 Avenue S.W.
Calgary, Alberta
T2R 0A5
(403) 264-3743 Fax: (403) 262-4409

Contact: Mr. Michael O'Connell, Vice President, Technology Application

Company Founded: 1984

Products and Services: ATC Environmental Group Inc. is a growth-oriented environmental company providing recycling, site remediation and microbial metabolism based waste reduction technologies to industry and government throughout North America. The company provides microbial-based solutions in two applications: reduction of sludge generated during the wastewater treatment process and remediation of hydrocarbon contaminated sites.

The company's field-proven microbial metabolism based biotechnological formulations, when added to either aerobic or anaerobic digesters, reduce the amount of biosolids generated through the wastewater treatment process by as much as 91 per cent. Accordingly, costs of transporting the sludge to either landfills, incinerators or agricultural lands for farm application are significantly reduced. Similarly, operating costs such as electrical consumption may be lessened as efficiency gains in the operation are realized.

ATC incorporates non-pathogenic microbial solutions in its hydrocarbon and organically contaminated site remediation services. On the basis of the chemical, biological and physical profile of the contaminated soil and the findings of a treatability/feasibility study conducted in its laboratory, ATC Environmental Group develops a custom nutrient optimization package designed to stimulate the metabolic activity of the indigenous micro-organisms.

Banner Pharmacaps

5807 - 47 Avenue
Olds, Alberta
T4H 1S7
(403) 556-2531 Fax: (403) 556-7079

Contact: Mr. Tom Tardi, General Manager

Company Founded: 1980

Products and Services: Banner Pharmacaps operates a facility designed to encapsulate specialty drugs and chemicals, including cytotoxic compounds and immunosuppressants. With more than 120 employees, Banner produces 1.3 billion soft gelatin capsules per year with a value of US$15 million.

One of four Banner gelatin product manufacturing plants in North America, Olds has been chosen as the company's central research site, making it the only facility of its kind in North America. Manufacturing is performed using the most recent technology in containment room systems, affording customer access to technologies in softgel/soflet development never before available.

Banner Pharmacaps plans a long-term expansion program involving potential investment of $5 million and total staff of close to 300.

Biomira Inc.

Edmonton Research Park
2011 - 94 Street
Edmonton, Alberta
T6N 1H1
(403) 490-2812 Fax: (403) 463-0871

Contact: Mrs. Jane Jack, Investor Relations Coordinator

Company Founded: 1985

Products and Services: Biomira Inc. is a company dedicated to the diagnosis and treatment of cancer. The company's product line is well suited for disease management of cancer, from early detection with its diagnostic products through to treatment with non-toxic therapeutic vaccines.

TRUQUANT® radioimmunoassay cancer diagnostic kits are manufactured and distributed by a Biomira subsidiary, ADI Diagnostics Inc.. A Premarket Approval Application (PMA) will be filed in the U.S. in 1995 for the TRUQUANT® BR™ breast cancer tumour marker kit.

Radioimmunoimaging (RII) is a technology that couples radioactive isotopes to monoclonal antibodies and uses this complex (radioimmunoconjugate) to locate cancer cells in the body. Under the trade name Tru-Scint®, Biomira is developing several different RII agents, each employing a different monoclonal antibody targeted at a different type of cancer. Clinical trials in Canada and Germany have indicated high sensitivity and specificity of Tru-Scint® compounds for diagnosing breast cancer and squamous cell carcinomas of the head and neck. Tru-Scint® AD™ will be in Phase III clinical trials in the U.S. in 1995 for recurrent breast cancer. Phase III clinical trials in ovarian cancer are anticipated to start in the latter half of 1995.

Active Specific Immunotherapy (ASI) is a new approach to cancer therapy. Biomira's THERATOPE® therapeutic vaccine utilizes chemically defined, synthetic cancer-associated carbohydrate antigens for ASI in studies of high incidence, lethal carcinomas such as those in the colon, ovary and breast. Biomira has developed patented methods and proprietary knowledge to synthesize some cell surface molecules that differentiate malignant from healthy cells. Through the injection of THERATOPE®, the patient's own immune system is stimulated to fight the cancer. Clinical trials are underway in Canada, the U.S. and U.K. Biomira's second therapeutic vaccine, BPI-7 (MUC-1 Peptide), has entered a Phase I breast cancer clinical trial in Canada.

Biomira Research Inc.

1134 Dentistry/Pharmacy Building
University of Alberta
Edmonton, Alberta
T6G 2N8
(403) 492-3920 Fax: (403) 492-8999

Contact: Dr. A. A. Noujaim, President

Company Founded: 1994

Products and Services: A wholly-owned subsidiary of Biomira Inc., Biomira Research Inc. was formed to develop novel cancer therapeutics on an international scale.

Three promising products/technologies are currently being developed for the treatment of ovarian, pancreatic, and breast cancer. The company's Anti-idiotype Induction Therapy (AIT™) and Immunoradiotherapy (IRT™) technology, as well as products for ovarian cancer and pancreatic cancer, are based on over 10 years work carried out by the company's senior management. Patents have been filed in the U.S. and Europe.

The company has identified a $1-billion market for an alternative treatment for advanced ovarian and pancreatic cancer. Existing treatment modalities, including surgery, radiation therapy and chemotherapy, have demonstrated limited effectiveness in extending survival rates or improving patients' quality of life. This alternative treatment will have significant cost benefit implications for the health care industry as it may be administered on an out-patient basis.

Biomira Research Inc. is currently one of only two known operations pursuing AIT™ for cancer therapy. No other company is known to be pursuing IRT™. The company's cancer therapeutic program focuses on accelerated government approval and commercialization.

Briana Bio-Tech Inc.

2200, 10404 - 103 Avenue
Edmonton, Alberta
T5J 0H8
(403) 423-1038 Fax: (403) 426-1881

Contact: Mr. John Tkachuk, President

Company Founded: 1989

Products and Services: Briana Bio-Tech Inc. is committed to the development and marketing of innovative cancer diagnostic tests.

Through its wholly-owned subsidiary, AMDL Canada Inc., Briana owns exclusive Canadian marketing rights to systems for early detection and monitoring of a broad range of cancers. In particular, Briana has funded research and development of the DR-70™ Tumor Marker test by California-based AMDL Inc. AMDL scientists developed the test procedure that accurately measures the quantity of DR-70™ Tumor Marker in blood serum, when normal cells become malignant.

Pre-clinical studies have shown that DR-70™ presents itself at the earliest stages of cancer and the quantity produced is proportional to the rate of tumor growth. Since all types of cancer studied to date produce DR-70™, the tumor marker could become the basis for detecting any type of malignant growth through a rapid, reliable, inexpensive and non-invasive test.

Clinical trials of the DR-70™ Tumor Marker technology for lung cancer are currently under way at the Cross Cancer Institute in Edmonton. With positive results, Briana expects future clinical trials to be directed to other forms of cancer, including breast and prostate cancers.

Briana and AMDL jointly market the system worldwide. The exceptions are Canada, where Briana has marketing rights, and the United States, where AMDL is the exclusive marketer.



Canadiana Genetics Inc.

Box 579
Carstairs, Alberta
T0M 0N0
(403) 337-1818 Fax: (403) 337-2913

Contact: Dr. Martin Wenkoff, President

Company Founded: 1988

Products and Services: Canadiana Genetics Inc. provides products and services designed to increase livestock productivity based on genetics. The company utilizes the latest technologies in the production and marketing of cattle embryos, goat embryos, elk embryos, deer embryos, bull semen, elk semen, goat semen, and live cattle. The company is one of few in the world with experience in embryo transfer in small ruminants.

While Canadiana has an established market and international reputation as a qualified Canadian and international Bovine Embryo Transfer service company (embryo services and exports completed in more than 15 countries), additional training and research continue in order to maintain a competitive advantage and further enhance market demand for transfer services. Because embryo technologies and services complement the semen business, the company is increasing its marketing efforts in the billion-dollar-a-year semen industry.

Canadiana's performance is among the best in the world with approximately 66 per cent of transfers successful. Present testing and studies are intended to increase embryo yields, reduce the generation intervals and reduce embryo costs.

Canadiana has recently imported Tuli cattle embryos from Zimbabwe and is now the only source for Tuli genetics outside Africa.

Cominco Ag-Biologicals

Division of Cominco Fertilizers Ltd.
426, 10333 Southport Road S.W.
Calgary, Alberta
T2W 3X6
(403) 258-4600 Fax: (403) 258-5760

Contact: Mr. R. J. Rennie, Ph.D., Director, New Products/R&D

Company Founded: 1990

Products and Services: Cominco Ag-Biologicals researches, develops and markets biological products and services that increase crop productivity by either directly stimulating moisture and nutrient uptake by the plant or by controlling soil-borne root diseases.

Products under development include dinitrogen-fixing rhizobial inoculants for legumes (lentil, pea, field bean) which take nitrogen directly from the air and give it to the legume plant, thus minimizing the need for fertilizer nitrogen addition; plant growth-promoting rhizobacteria (PGPRs) inoculants which directly stimulate plant root development and may translate into a yield increase; and biological control agents (BCAs) which control soil-borne pathogens. A healthier disease-free root also takes up more moisture and nutrients, resulting in a yield benefit.

All current products are designed to be applied directly into the seed at the time of planting and are targeted at a variety of Great Plains prairie markets from legumes to wheat, barley and canola. PGPRs are also being developed to reduce "outplanting shock" in the silviculture market and to increase productivity in horticulture markets.

The Cominco Ag-Bio team also has one of the world's largest banks of microbial strains. Their application focuses on agriculture but also includes forestry and the environment. Current forestry products target reforestation, specifically the increased survival of conifer seedlings. Cominco's environmental products presently target plant growth promotion on previously sterilized sites.

CV Technologies Inc.

308 Campus Tower
8625 - 112 Street
Edmonton, Alberta
(403) 432-0022 Fax: (403) 432-7772

Contact: Mr. Ken H.G. Broadfoot, Vice President

Company Founded: 1992

Products and Services: CV Technologies Inc. (CVT) was incorporated to commercialize the novel pharmaceutical products discovered by Professor Peter K. T. Pang. Professor Pang and his research team have technical expertise in the research of products to regulate calcium concentration within the cell. CVT has achieved early success through a $3-million research agreement with Miles Canada Inc. (a subsidiary of Bayer AG) to support the development of two new cardiovascular projects.

In addition to its research and development projects, CVT is pursuing preclinical testing of two products in North America: an anti-Alzheimer's drug CVT-A003; and an antihypertensive drug CVT-CCT2. Other development-stage products include Parathyroid Hypertensive Factor (PHF) for the treatment and diagnosis of hypertension, diabetes and several types of cancer; and Para-Thyroid Hormone (PTH) analogs for the treatment of osteoporosis.

In Asia, the company is preparing to market several novel over-the-counter healthcare products derived from herbs that stimulate the immune system. This will be done through a subsidiary called HerbTech Inc.

CV Technologies seeks strategic alliances with pharmaceutical companies to develop drugs for regulating intracellular calcium in cardiovascular and immunological areas. Natural phytochemicals are often used as lead compounds in these projects.

The company also seeks international licensees or joint venture partners for its patented products, CVT-A003, CVT-CCT2 and PTH analogs, as well as for its over-the-counter herbal products.



D

DowElanco Canada Inc.

1144 - 29 Avenue N.E.
Calgary, Alberta
T2E 7P1
(403) 253-3900 Fax: (403) 258-3681

Contact: Mr. David Dzisiak, Manager, Commercial Development

Company Founded: 1989

Products and Services: DowElanco Canada Inc. is a global leader in the discovery, development, manufacturing and marketing of value-added agricultural products in the crop protection, production and seeds industries. A research-focused company, it employs over 1,000 scientists specializing in chemistry, biology, botany, genetics, toxicology, biotechnology and environmental health. The research goal is to discover and optimize biological activity and develop value-added seed products through biotechnology.

DowElanco Canada's focus is the commercialization of technology to support Canadian agriculture. In addition to internal research efforts, the company engages in strategic research alliances in the areas of biologicals for crop production and protection and in plant biotechnology. Commercial business applications of DowElanco's products and services include major field crops, forestry, turf and insect management.

Grow Tec Ltd.

A Subsidiary of
CIC Canola Industries Canada Inc.
Box 147
Nisku, Alberta
T0C 2G0
(403) 955-8822 Fax: (403) 955-2969

Contact: Mr. E.A.P. (Andy) Brown, President

Company Founded: 1986

Products and Services: Grow Tec Ltd. operates two production plants (Nisku, Alberta and Saskatoon, Saskatchewan) which provide an essential seed coating service to major agricultural seed suppliers, who in turn sell to farmers. The main services are the coating of canola seed, legume and grass seed with products such as pesticides or biologicals.

Grow Tec has worked on seed-related joint research projects with numerous companies and with organizations such as the Alberta Research Council. The company has also played a key role in other coating projects, including the development of a controlled-release nitrogen fertilizer with a major fertilizer manufacturer.

In addition to seed coating research, Grow Tec is engaged in genetic research targeting specific trait enhancement.



Isotechnika Inc.

508A, 11315 - 87 Avenue
Edmonton, Alberta
T6G 2C2
(403) 492-3677 Fax: (403) 492-9153

Contact: Dr. R.T. Foster, President

Company Founded: 1994

Products and Services: Formed as a spin-off company of the University of Alberta, Isotechnika Inc. is engaged in highly sophisticated and unique analyses of organic materials as well as the development of unique organic compounds. The analyses are particularly targeted towards product comparison, quality surveillance and control, adherence to regulatory requirements, and material sourcing and identification.

Isotechnika currently offers a wide range of analytical services. Based on a proprietary technology, the company is able to "fingerprint" virtually any organic substance (and many inorganic substances) to differentiate between seemingly identical chemicals or substances and determine their source of origin. The technology can be applied to the pharmaceutical, food and beverage, forensics and cosmetics industries, as well as in the tracing of toxins and other substances.

Using this analytical technology, Isotechnika has been able to develop a unique, proprietary method of modifying drugs and chemicals to rapidly create new patentable products with improved properties. Based on a unique modification procedure which can make virtually any drug, the company can improve a drug's potency, duration of action, or any number of other properties.

With Isotechnika's technology, a modified drug can be developed much more quickly and cheaply, compared to the "trial and error" methods currently employed by would-be competitors trying to develop their own version of a patented parent drug. In addition, the nature of the modification is predicted to increase the half-life of the drug. Thus, Isotechnika is able to offer a significant competitive advantage in the development of drugs derived from a prototype molecule.

Isotechnika also offers conventional analytical techniques including high pressure liquid chromatography, gas chromatography, nuclear magnetic resonance spectroscopy, differential scanning calorimetry and numerous other techniques.

Kiseki Environmental Corporation

1145E - 44 Avenue S.E.
Calgary, Alberta
T2G 4X4
(403) 287-9000 Fax: (403) 287-3999

Contact: Mr. Mark Bishop, President

Company Founded: 1987

Products and Services: Kiseki Environmental Corporation has developed an environmental biotreatment system to provide industry with a cost-effective method of cleaning up oilfield and industrial waste. To complement Kiseki's environmental bioremediation capabilities, the company provides on-site thermal desorption services which provide an immediate solution to numerous contamination problems. Kiseki's portable equipment eliminates the need for transportation of wastes and therefore reduces clients' liability.

Kiseki has developed and introduced technology using biological methods (micro-organisms) for the petroleum industry to control paraffin in producing oil wells without harmful environmental side effects. This technology reduces costs, compared to conventional processes. Kiseki also utilizes biological products for both augmentation and maintenance programs associated with maintaining regulatory limits at wastewater treatment facilities.

In addition, Kiseki's technical team can provide assistance for environmental assessment and design of a cost-effective remediation program utilizing the best available technology.

Monsanto Canada Inc.

Box 38
Coalhurst, Alberta
T0L 0V0
(403) 381-4728 Fax: (403) 381-3111

Contact: Dr. William Hamman, Field Research Manager

Company Founded: 1951

Products and Services: Monsanto Canada Inc. is a wholly-owned subsidiary of Monsanto Company of St. Louis, Missouri, a world leader in high value chemicals, plastics and man-made fibres, agricultural chemicals, pharmaceuticals and food ingredients.

The Agricultural Business Unit manufactures and markets a range of crop protection products for cereal grains, row crops, forestry management and turf control. Monsanto is the largest supplier in Canada of these crop protection products. The Unit invests heavily in R&D in Canada, including new products from molecular biology for pest (weed, insect, viral and fungal) tolerance, food quality improvement and food processing enhancements.

Monsanto's Lethbridge Research Station, opened in 1991, focuses on improving current product performance and on introducing new technologies to Canadians and the worldwide agricultural community. Activities in Alberta include collaborative biotechnology projects and extensive trials on current products such as RoundUp Ready™ canola, and new discoveries with other Monsanto biotechnology centres.



NeuroSpheres Ltd.

Room 83, Heritage Medical Research Building
3330 Hospital Drive N.W.
Calgary, Alberta
T2N 4N1
(403) 220-8878 Fax: (403) 270-4264

Contact: Mr. Scott Cormack,
Corporate Development Officer

Company Founded: 1992

Products and Services: NeuroSpheres Ltd. was established to research, develop and commercialize Neural Stem Cell Technology and to acquire and develop complementary technologies. The founding technology, discovered by University of Calgary researchers, is based on the existence of a cell population (neural stem cells) possessing the ability to generate new brain cells. Prior to the development of this technology, brain cell regeneration was thought to be impossible as it was believed that the brain did not possess the ability to replace cells lost to injury or disease.

The company is developing processes that allow for the expansion of normal brain cells in the brain and in the laboratory. The latter will be used for brain cell transplants and for *in vitro* assays that evaluate the effects that new and existing therapeutic agents have on the brain.

Brain cell transplants and stimulation of brain cell production within the brain have application in the treatment of diseases characterized by the loss of or damage to brain cells, including Alzheimer's Disease, Parkinson's Disease, Lou Gehrig's Disease, Huntington's Disease, Multiple Sclerosis, stroke, and head and spinal cord injuries.

NeuroSpheres receives significant financial and technical contributions through research collaborations with Ciba Geigy, Chiron and CytoTherapeutics. The company has also received financial support from the Alberta Heritage Foundation for Medical Research through its commercialization program. The Medical Research Council of Canada supports research on the Neural Stem Cell Technology through a grant to the co-founder of NeuroSpheres at the University of Calgary.

Norac Technologies Inc.

12, 4290 - 91A Street
Edmonton, Alberta
T6E 5V2
(403) 461-7163 Fax: (403) 450-1016

Contact: Dr. D. A. Evans, Vice President,
Product Development

Company Founded: 1985

Products and Services: Norac is a leader in the application of advanced technology for the extraction, fractionation and purification of botanical and biological raw materials for highest quality flavors, and cosmetic, pharmaceutical and biotechnology ingredients. The Norac SC™ patented process results in purer products, uncontaminated with chemical solvents.

With more than eight years experience in one of the largest integrated state-of-the-art pilot facilities in North America, Norac understands industry's needs in concept testing, optimization, process costing, product evaluation, scale-up, system configuration, commercial plant design and toll processing. The company's services are available to the food, spice, aroma, health food, pharmaceutical, biotechnology and cosmetic industries.

Alliances include the Alberta Research Council, the Fox Chase Cancer Clinic (Philadelphia) and the University of Alberta. The firm seeks international cooperation in testing the Norac Recovery System on specific product applications.

Norwest Soil Research Ltd.

9938 - 67 Avenue
Edmonton, Alberta
T0E 0P5
(403) 438-5522 Fax: (403) 434-8586

Contact: Mr. Jean Crepin, Chief Executive Officer

Company Founded: 1975

Products and Services: Norwest Soil Research Ltd. focuses on the use of a transgenic nematode line which has been encoded to respond to a variety of chemical stressors. The organisms have been tested against a number of metals and a few chemical organics. Ongoing research and development will focus on increasing the variety of toxic substances and the concentration levels of one-time and cumulative exposures to the organisms. This will develop an understanding of the response of the organisms to various sub-lethal doses of metallic and organic compounds, expanding the applicability of these organisms as toxicity biosensors.

The company already provides a complete range of analytical chemistry and bioassay testing services to various industries and environmental consultants. Bioassays provide an excellent tool to assess toxicity as a support to chemical analyses or as a method of screening prior to analysis. By using stress response as a method of estimating toxicity, environmental managers may gain a better understanding of the possible long-term impact than is available with current LC50 assays.

Norwest Soil Research Ltd. estimates that demand for toxicity testing will increase and the company will use its biotechnology experience to develop new tools for both the field and the laboratory environment.



P

Prairie Biological Research Ltd.

Block C, 4290 - 91 Street
Edmonton, Alberta
T6E 5V2
(403) 450-3957 Fax: (403) 450-3960

Contact: Dr. R.D. Mehta, President & CEO

Company Founded: 1984

Products and Services: Prairie Biological Research Ltd. (PBR) is a biological research and testing laboratory, specializing in microbiological and toxicological applications to environmental problems and R&D in environmental diagnostic products. As Canada's only privately-owned genetic toxicology testing lab, it offers a wide range of tests in this area.

The company applies its expertise in microbiology, toxicology and biotechnology to monitoring environmental pollution and protecting human health. It specializes in site remediation, biotreatment of effluents, immunoassay and DNA probe technologies and biochemical tests, and qualitative and quantitative risk assessments from exposure to hazardous chemicals.

Prairie Biological Research has developed a cost-effective enzyme immunoassay kit for detecting microcystins (liver toxins and tumor-promoting agents) produced by blue-green algae in fresh water. The kit is expected to be on the market in the near future. PBR also offers an exclusive biochemical assay for rapid screening of diarrhetic shellfish toxins. The laboratory specializes in developing site-specific strategies for applying bioremediation technology to contaminated sites.

The company offers its testing and contract research services to public and private sector clients throughout Canada, including pharmaceutical/chemical manufacturers, engineering firms, and the petrochemical, pulp and paper, and food manufacturing and processing industries.

Prairie Biological Research is interested in developing contacts in the public and private sector who are responsible for food and chemical safety, water quality, indoor air quality, effluent treatment, remediation of contaminated sites, and antimicrobial product efficacy. It seeks joint ventures or strategic alliances with companies having complementary business interests in the above areas.

Raylo Chemicals

Division of Terochem Laboratories Ltd.
8045 Argyll Road
Edmonton, Alberta
T6C 4A9
(403) 468-6060 Fax: (403) 468-4784

Contact: Mr. Matthew Colomb,
Sales Director, North America

Company Founded: 1963

Products and Services: Raylo Chemicals researches, develops, and manufactures high technology fine chemicals. In addition, Raylo manufactures pharmaceutical actives and intermediates with a focus on the synthesis of new chemical entities under Good Manufacturing Practices (GMP). The company has special expertise in nucleoside and carbohydrate chemistry, and is a leading producer of fine chemicals including oxalyl chloride, N,N'-carbonyldiimidazole and DMT-protected nucleosides.

Raylo markets its products to the biotechnology industry, to large pharmaceutical companies, to the photographic industry and to many other industries that require specialized chemicals.

Raylo has many contracts in the field of pharmaceutical chemistry and has been a prime supplier to the U.S. National Institutes of Health for a number of experimental anti-AIDS drugs in commercial quantities. Its expertise in nucleoside and carbohydrate chemistries has also been recognized by many multi-national pharmaceutical firms who have placed orders for chemicals having potential anti-cancer and anti-viral activity.

Raylo has a very strong presence in international markets. Ninety per cent of its sales are to the U.S., the U.K. and Europe.



S.P.I. Diagnostics Inc.

4485 - 99 Street
Edmonton, Alberta
T6E 5B6
(403) 439-4888 Fax: (403) 439-6103

Contact: Mr. Kevin Ens, President & COO

Company Founded: 1993

Products and Services: A subsidiary of S.P.I. Synthetic Peptides Incorporated, S.P.I. Diagnostics Inc. was formed to commercialize and market clinical diagnostic products. The parent company has considerable expertise in peptide chemistry, immunology, monoclonal antibody production and proprietary chemical conjugation methods. It focuses primarily on the development of technologies for the prevention and diagnosis of bacterial and fungal infections.

Both companies have built an extensive network of collaborating organizations, including the University of Alberta and the Canadian Bacterial Diseases Network, from which they have licensed various technologies for commercial development.

Diagnostic products include the company's Accu-MAb– *Bordetella pertussis/Bordatella parapertussis* Dual Fluorochrome DFA reagent for the detection of *B. pertussis* and *B. parapertussis* (whooping cough) in clinical specimens; and a Peptide Enzyme Linked Assay (PELA-K), a unique, non-invasive diagnostic for pneumonia. Initial clinical results indicate PELA-K can be used to reliably diagnose the onset of pneumonia in Intensive Care Unit (ICU) patients.

S.P.I. Diagnostics currently seeks international distributors for its pertussis diagnostics as well as partners interested in joint development and marketing of its PELA-K diagnostic for pneumonia. The company is also interested in licensing new diagnostic technologies for commercialization.

S.P.I. Synthetic Peptides Inc.

4465 - 99 Street
Edmonton, Alberta
T6E 5B6
(403) 439-5932 Fax: (403) 439-6103

Contact: Dr. Robert Hodges, President & CEO

Company Founded: 1986

Products and Services: Established as an R&D company to commercialize products in the area of peptide pharmaceuticals, peptide diagnostics and synthetic vaccines, S.P.I. has added new dimensions in terms of custom peptide synthesis for biotech and pharmaceutical firms, HPLC (High Performance Liquid Chromatographic) peptide standards of calibrating HPLC instruments, and computer software for structure prediction and improvement in purification methodology.

To produce its biologically active peptides, peptide diagnostics and synthetic vaccines, S.P.I. creates small peptides and protein fragments synthetically. The current development focus is on an anti-bleeding compound which has been shown in animal trials to reduce bleeding time by 30 per cent to 60 per cent; and on a patented synthetic vaccine against pseudomonas infection.

While the company does not engage in basic research, it has the opportunity to license promising ideas or technology, then complete the discovery phase. Upon completion of Phase I and/or Phase II clinical trials, S.P.I. intends to license the further development and marketing to large international pharmaceutical firms.

S.P.I. has a sales office in Toronto, representation in Dublin, Ireland, and agreements with international distribution networks for its HPLC peptide standards and software.

The company also functions as a Centre of Excellence in Bacterial Diseases.

SynPhar Laboratories Inc.

4290 - 91A Street
Edmonton, Alberta
T6E 5V2
(403) 462-4044 Fax: (403) 461-0196

Contact: Mr. Christopher G. Micetich,
Director of Operations

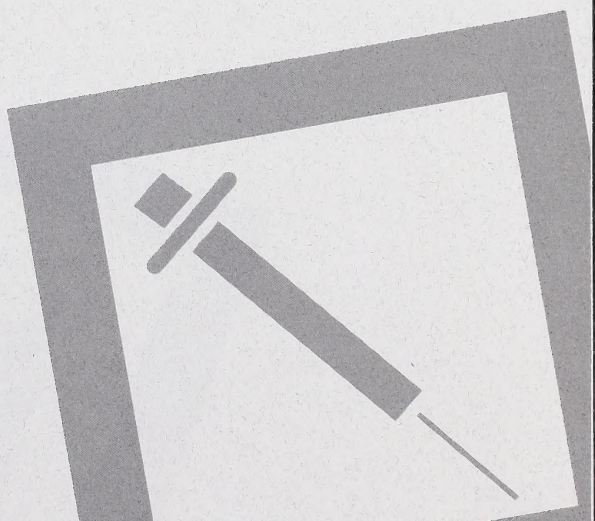
Company Founded: 1987

Products and Services: SynPhar Laboratories Inc. is a joint venture pharmaceutical R&D company between Taiho Alberta Ltd. (a wholly-owned holding company of Taiho Pharmaceutical Co. Ltd. of Japan) and Dr. Ronald Micetich. The company was formed as a result of a decade of collaborative research by Taiho and Dr. Micetich, a medicinal chemist at the University of Alberta.

SynPhar's main areas of research are the design, synthesis and testing of potential commercial drugs for infectious diseases. Areas of specific interest are antibiotics, antifungal, antiviral and anticancer agents. SynPhar is also interested in specific aspects of drug delivery and formulation.

SynPhar-directed activities during the drug development process include acute and chronic toxicity trials, drug metabolism and pharmacokinetic studies, and clinical trials in Canada and the United States.

The company has also established a kilogram-quantity scale-up laboratory in Edmonton. Long-range plans include the possibility of establishing manufacturing and marketing operations.



SYNSORB Biotech Inc.

4th Floor, North Tower
Sun Life Plaza
140 - 4 Avenue S.W.
Calgary, Alberta
T2P 3N3

(403) 265-7600 Fax: (403) 265-9154

Contact: Dr. Brad Thompson, President & CEO

Company Founded: 1994

Products and Services: SYNSORB Biotech Inc. (SBI) is a biopharmaceutical company founded to exploit a variety of applications of SYNSORB technology. A SYNSORB is an oligosaccharide attached through a hydrophobic linker arm to an inert support.

SBI currently has products for sale for use in the blood products industry and organ transplantation. SYNSORB A and SYNSORB B are used in the manufacturing process to prepare gammaglobulin. ARCSORB is used in the manufacturing process to prepare universal plasma. BIOSYNSORB is used in ABO-incompatible organ transplantation.

SBI's major research and development focus at this time is on enteric diseases caused by enterotoxigenic bacteria. The lead product in this area, SYNSORB Pk, started Phase II clinical trials in June, 1994 in Canada for the prophylactic prevention of Hemolytic Uremic Syndrome, known in its early stages as "hamburger disease". The second product, SYNSORB Cd, entered animal model trials in August 1994. This product will be used for the treatment of patients with *Clostridium difficile* associated diarrhea (CDAD). Two other products are at the *in vitro* stage of development.

Discover the Alberta Advantage



For more information contact:

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